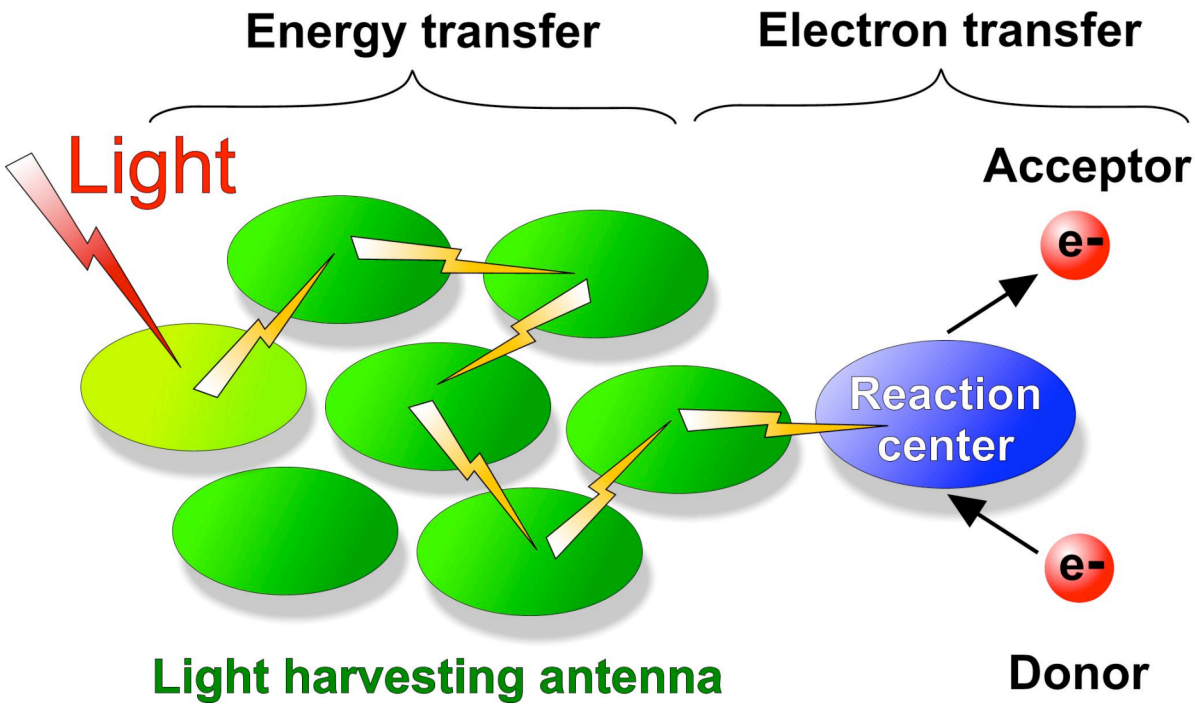
Photosynthetic Antenna Research Center
EFRC Director: Robert E. Blankenship
Lead Institution: Washington University in St. Louis

Mission Statement: The mission of PARC is *to understand the basic scientific principles that underpin the efficient functioning of natural photosynthetic antenna systems as a basis for design of manmade systems to convert sunlight into fuels.*

This Energy Frontier Research Center is a program in basic scientific research aimed at understanding the principles of light harvesting and energy funneling as applied to natural photosynthetic, biohybrid and bioinspired antenna systems. The project will be organized around three programmatic themes:
1 – Natural Antennas: Structure and Efficiency
2 – Biohybrid Antennas: Organization and Implementation
3 – Bioinspired Antennas: Design and Characterization

Specific underlying issues include structure determination of natural antennas using both traditional and novel techniques at different levels of scale as well as the connections between new structural detail and functional characteristics. Other areas of research involve elucidation of how the size and pigment composition of natural antenna systems affect the efficiency of energy conversion as well as how the range of photosynthetically active radiation might be extended into other wavelength regions of the solar spectrum. Additional research goals involve how bioinspired and biohybrid systems can be designed and assembled to use the principles of natural antennas to enhance energy collection and storage.

Methods that will be utilized will include: X-ray crystallography, neutron diffraction and scattering, electron microscopy, photobioreactor growth analysis, scanning probe microscopy,



hyperspectral imaging spectroscopy, ultrafast laser fluorescence spectroscopy, density functional theory, molecular dynamics calculations, surface chemistry, synthetic chemistry, *de novo* protein design, RNAi technology, and recombinant DNA technology.

Significant educational and outreach efforts will be made at the K-12, undergraduate and graduate levels. Advanced electronic communication and networking techniques will be used to keep the team in constant communication, and a yearly "all hands" meeting will bring all the participants together to discuss progress, plans and strengthen collaborations.

Potential outcomes and benefits include elucidation of the basic scientific principles that underlie the efficient functioning of natural photosynthetic antenna systems and how those principles can be translated into biohybrid and bioinspired complexes that will form the basis for next-generation systems for solar energy conversion.

This project will bring together a core of seventeen diverse scientists to form an interdisciplinary team. The team includes five Washington University professors along with five national laboratory participants from Oak Ridge, Sandia and Los Alamos National Laboratories. In addition, six other academic scientists from universities in the US and the United Kingdom and one from a US private research institute round out the team. This international interdisciplinary team brings extraordinary breadth and depth of intellectual and technical expertise to this important research area.

Photosynthetic Antenna Research Center (PARC)	
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